

# NOTES ON THE DISTRIBUTION AND NOMENCLATURE OF NORTH AMERICAN *GENTIANOPSIS* (GENTIANACEAE)<sup>1</sup>

James S. Pringle

Royal Botanical Gardens  
P.O. Box 399, Hamilton  
Ontario, CANADA L8N 3H8  
jpringle@rbg.ca

## ABSTRACT

The new combinations *Gentianopsis detonsa* subsp. *nesophila* and *G. virgata* subsp. *macounii* are published, bringing infraspecific classification into accord with the currently accepted names for the respective species.

## RESUMEN

Las nuevas combinaciones *Gentianopsis detonsa* subsp. *nesophila* y *G. virgata* subsp. *macounii*, son publicadas trayendo la clasificación infraspecific de acuerdo con los nombres actualmente aceptados para las respectivas especies.

The fringed-gentian genus *Gentianopsis* Y.C. Ma is represented in North America north of Mexico by *G. barbellata* (Engelm.) H.H. Iltis and *G. simplex* (A. Gray) H.H. Iltis, which are believed to be relatively distantly related to the other North American species, and by two complexes (sensu Bouillé and Bousquet 1999) for which classifications have varied. These complexes correspond, respectively, to the taxa designated *Gentianella detonsa* (Rottb.) G. Don and *G. crinita* (Froel.) G. Don by Gillett (1957). Recent authors on *Gentianopsis* have generally adopted less inclusive species concepts.

In the *Gentianopsis detonsa* complex in North America the calyx keels are smooth and are suffused with purple. Branches often arise at or near the base of the main stem, except in *G. macrantha* (D. Don ex G. Don) H.H. Iltis. The basal rosettes of leaves are usually persistent at flowering time, and the cauline as well as the basal leaves are obtuse except in *G. detonsa* (Rottb.) Y.C. Ma subsp. *detonsa*. The peduncles are relatively long, those terminating the primary stems often being longer than the stems. Three western taxa in this complex are separated from each other geographically, viz. *G. macrantha*, *G. holopetala* (A. Gray) H.H. Iltis, and *G. thermalis* (Kuntze) H.H. Iltis. They have usually been treated as species in recent literature, although *G. thermalis* is sometimes included in *G. detonsa* as var. *elegans* (A. Nels.) N.H. Holmgren. Some recent as well as earlier authors have treated the remaining North American taxa in this complex as two or three species; others have included all of them in *G. detonsa*.

<sup>1</sup>Contribution No. 125 from the Royal Botanical Gardens, Hamilton, Ontario, Canada.

Within *G. detonsa*, three geographic races in North America north of Mexico have usually been accepted as subspecies since they were first so treated by Gillett (1957), viz. subsp. *detonsa*, subsp. *raupii* (A.E. Porsild) Å. Löve & D. Löve, and subsp. *yukonensis* (J.M. Gillett) J.M. Gillett. A fourth taxon, subsp. *nesophila*, is the only representative of this complex in eastern North America. It has more often been treated as a separate species, but neither in the transfer of the epithet to *Gentianopsis* (Ilitis 1965) nor in any of the works in which the name *Gentianopsis nesophila* (Holm) H.H. Ilitis has been employed has the rank appropriate for this taxon been discussed. Some recent authors, e.g. Blaney and Kotanen (2001), have simply included the taxon *nesophila* in *Gentianopsis detonsa* s. lat., there being no nomenclatural combination under *G. detonsa* by which it could be distinguished.

Subspecies *raupii* is notably variable in vegetative morphology. Plants in some populations approach subsp. *nesophila* in leaf shape and width, as noted by Gillett (1957) and in my studies, whereas other plants are more similar to subsp. *detonsa* and *yukonensis*. Conversely, plants of subsp. *nesophila* from the shores of James Bay sometimes approach subsp. *raupii*. Reports of subsp. *raupii* as a taxon rare in or perhaps extirpated from Ontario (Gillett & Keddy 1983) are based on three specimens from the shores of Hudson and James bays so identified by Gillett in 1957. All of these specimens have also, at times, been identified as *nesophila*. Boivin (1972) commented that they "have the shorter flowers and broader leaves" of *nesophila* and reidentified them accordingly. In my examination of these specimens I found that all three conform to the morphology of subsp. *nesophila*, and differ from that of subsp. *raupii*, in having corolla lobes distinctly less than half as long as the tube, with the margins subentire or merely toothed rather than fringed proximally. Two of these collections, *Dutilly & Lepage 16925* and *Lepage 31666* (both DAO), resemble subsp. *raupii* vegetatively in having fewer leaves than is usual in subsp. *nesophila*, but the third, *Spreadborough 9 Aug 1904* (CAN), fits well within the range of variation of subsp. *nesophila* in all respects. It was reidentified as *nesophila* by Gillett in 1979 (annotation). Cody (1971) and Porsild and Cody (1980) considered subsp. *raupii* to be endemic to the watershed of the Mackenzie and Slave rivers in the Northwest Territories and northern Alberta. In accord with their interpretation, I include all plants of *G. detonsa* s. lat. in the saline coastal meadows on the James and southern Hudson Bay shores in subsp. *nesophila*, rather than treating occasional plants as subsp. *raupii*, i.e., as geographically remote and ecologically anomalous occurrences of a different taxon, within the range and habitat of subsp. *nesophila*.

Subspecies *nesophila* is usually less similar in aspect to subsp. *detonsa* and *yukonensis* than to subsp. *raupii*. Among plants of comparable stature, those of subsp. *nesophila* are more often branched from the base, and the basal and proximal cauline leaves are generally wider, more numerous, and more

closely spaced than those of subspp. *detonsa* and *yukonensis*. Also, as noted above, the corolla lobes of subspp. *nesophila* are less than half as long as the tube, whereas in the other subspecies they are more than half as long. Gillett (1957) observed, however, that occasional plants of subspp. *nesophila* from Newfoundland "resemble the typical subspecies [*detonsa*] rather closely." Conversely, some specimens of subspp. *detonsa*, e.g. *Ull 30 August 1987* (CAN) from the shore of Kotzebue Sound, Alaska, and some from Iceland (seen at GH), have a leafy aspect approaching that of subspp. *nesophila*.

Subspecies *nesophila* shares with subspp. *raupii* (while thus differing from subspp. *detonsa* and *yukonensis*) the combination of the calyx abruptly constricted at the base, all four calyx lobes nearly equal in length, a distinctly obconic rather than nearly cylindrical corolla tube, proportionately wide corolla lobes with rounded rather than subacute apices, and seed coats with the papillae relatively large and distributed over the whole surface rather than being restricted to the ends (Gillett 1957, 1963). In these respects subspp. *raupii* is more similar to subspp. *nesophila*, from which it is relatively often separated at species rank, than to subspp. *detonsa* or subspp. *yukonensis*, with which it is usually treated as conspecific. The similarities between the taxa *nesophila* and *raupii* were recognized by Toyokuni (1967-1968), who treated them as one species, *G. nesophila*, comprising subspp. *nesophila* and subspp. *raupii* (A.E. Porsild) Toyok., and treated residual *G. detonsa* as another species. Nevertheless, despite the differences in morphology between most plants of *G. detonsa* subspp. *detonsa* and *yukonensis* and those of the *nesophila/raupii* group, the separation of the latter group at species rank does not seem appropriate when *G. detonsa* s. lat. is considered more thoroughly. As noted above, some plants of both subspp. *nesophila* and subspp. *raupii* approach subspp. *detonsa* in vegetative morphology. Subsp. *yukonensis* appears intermediate between subspp. *raupii* and subspp. *detonsa*, with some plants of subspp. *yukonensis* approaching each of those subspecies in morphology. I am, therefore, following Gillett (1957, 1963), Scoggan (1979), and Riley and McKay (1980) in including the taxon *nesophila* among the subspecies of *G. detonsa*, retaining the rank of subspecies that currently prevails in treatments of North American *Gentianopsis*. This requires the following transfer to *Gentianopsis*:

***Gentianopsis detonsa* subsp. *nesophila* (Holm) J.S. Pringle, comb. nov.** BASIONYM:

*Gentiana nesophila* Holm, Ottawa Nat. 15:111. 1901. *Gentianella detonsa* subsp. *nesophila* (Holm) J.M. Gillett, Ann. Missouri Bot. Gard. 44:216. 1957; *Gentianopsis nesophila* (Holm) H.H. Iltis, Sida 2:134. 1965; *Gentiana detonsa* var. *nesophila* (Holm) B.Boivin, Nat. Canad. 93:1060. 1966. TYPE: CANADA: QUEBEC: Anticosti Island, near Salt Lake, *Macoun s.n.*, 9 Aug 1883 (HOLOTYPE: CAN!; photo DAO).

In the *G. crinita* complex the calyx keels are generally minutely granular- or papillate-scabridulous proximally as seen at 50 $\times$ , and may or may not be suffused with purple. Branching from the base of the main stem occurs occasion-

ally in *G. virgata* subsp. *macounii* but is otherwise rare. The basal rosettes are often withered by flowering time, and the apices of the cauline leaves are acute to acuminate. Peduncle length varies, often being relatively long in *G. virgata* subsp. *macounii* but otherwise generally being proportionately shorter than in the *G. detonsa* complex. The *G. crinita* complex is predominantly eastern, although the range of *G. virgata* subsp. *macounii* extends west to the Northern Rocky Mountains. Chromosome counts for North American *Gentianopsis* remain few, but a difference in base number formerly thought to exist between the *G. crinita* and *G. detonsa* complexes now seems unlikely.

*Gentianopsis crinita* (Froel.) Y.C. Ma s. str. is distinguished by its combination of ovate to lanceolate leaves and corolla lobes that are fringed around the apex as well as laterally. In recent literature it has usually been treated as a species separate from the other components of the complex. The remaining taxa in this complex have narrowly lanceolate to linear leaves and corolla-lobe margins that are erose to dentate distally and fringed only laterally if at all. As with *G. detonsa* s. lat., some recent authors have recognized more than one species within this group, whereas others have treated these plants as a single species.

Bouillé and Bousquet (1999) found little divergence in nuclear ribosomal DNA internal transcribed spacers between *G. crinita* s. str. and the rest of this complex, in contrast to the greater divergence between taxa in the *G. crinita* complex and *G. detonsa* subsp. *nesophila*. They found no divergence at all among the other taxa in the *G. crinita* complex. They treated the *G. crinita* complex as a single species, *G. crinita*, consisting of subsp. *crinita* and subsp. *procera* (Holm) Å. Löve & D. Löve. Taxonomic recognition of the other entities was rejected. In more recent years, however, the appropriateness of nrDNA ITS as a genetic marker in the context of the circumscription of species and subspecies has increasingly been questioned. The taxa *virgata* s. str. (*procera* s. str.), *macounii*, and *victorinii* have diverged morphologically to the extent that they have consistently been recognized taxonomically for over 80 years, and they have become subjects of conservation concern. Presumably they have diverged in their DNA as well, even if not specifically in the nr ITS. I consider it appropriate, therefore, to maintain their taxonomic recognition.

Although *G. crinita* s. str. is less strongly divergent from the rest of the *G. crinita* complex than from the *G. detonsa* complex, I am treating *G. crinita* s. str. and *G. virgata* s. lat. as two species, in accord with most of the recent floras in which these species are included (e.g. Gleason & Cronquist 1991; Cooperrider 1995; Voss 1996; Wetter et al. 2001). This permits the continued recognition of the taxa *macounii* and *victorinii* as subordinate taxa within *G. virgata*, as was done by Iltis (in Mason & Iltis 1966) and Cronquist (in Gleason and Cronquist 1991, in both cases under *G. procera*), and by Lammers (2004) in the case of *G. virgata* subsp. *victorinii* (Fernald) Lammers. Morphological considerations do not support the recognition of *macounii* and *victorinii* as species. Both are simi-

lar to *G. virgata* subsp. *virgata* in morphology as well as in nrDNA ITS. Intergradation between the two wide-ranging subspecies, *virgata* (*procera*) and *macounii*, was noted by Gillett (1957) and Iltis (1965) and in my own studies.

*Gentianopsis virgata* has often been called *G. procera* (Holm) Y.C. Ma; on its nomenclature see Pringle (2003). When *G. virgata* is circumscribed as recommended above, one new combination under that specific epithet is required:

***Gentianopsis virgata* subsp. *macounii*** (Holm) J.S. Pringle, comb. nov. **BASIONYM** *Gentiana macounii* Holm. Ottawa Nat. 15:110. 1901. *Gentianella crinita* subsp. *macounii* (Holm) J.M. Gillett, Ann. Missouri Bot. Gard. 44:228. 1957; *Gentianopsis macounii* (Holm) H.H. Iltis, Sida 2:136. 1965; *Gentianopsis procera* subsp. *macounii* (Holm) H.H. Iltis, Trans. Wisconsin Acad. Sci. 54:315. 1966; *Gentianopsis crinita* subsp. *macounii* (Holm) Å. Löve & D. Löve, Taxon 31:352. 1982. **LECTOTYPE** (Gillett 1957): CANADA: ALBERTA: Lees Creek, Cardston, *Macoun s.n.*, 25 Jul 1895 (HOLOTYPE: CAN!; photo DAO).

#### REFERENCES

- BLANEY, C.S. and P.M. KOTANEN. 2001. The vascular flora of Akimiski Island, Nunavut Territory, Canada. *Canad. Field-Nat.* 115:88–98.
- BOIVIN, B. 1972. Flora of the Prairie Provinces. Part III—Connatae. *Phytologia* 22:315–398. Also published as *Provancheria* 4:1–84.
- BOUILLE, M. and J. BOUSQUET. 1999. Phylogenetic relationships and phylogeography of the *Gentianopsis crinita* complex (Gentianaceae) based on nrDNA ITS sequences. XVI International Botanical Congress Abstract Number 4070.
- CODY, W.J. 1971. A phytogeographic study of the floras of the continental Northwest Territories and Yukon. *Naturalist Canad.* 98:145–158.
- COOPERRIDER, T.S. 1995. The Dicotyledoneae of Ohio. Part 2. Linaceae through Campanulaceae. Ohio State University Press, Columbus.
- GILLETT, J.M. 1957. A revision of the North American species of *Gentianella* Moench. *Ann. Missouri Bot. Gard.* 44:195–269.
- GILLETT, J.M. 1963. The gentians of Canada, Alaska and Greenland. Res. Branch, Canada Dept. Agric., Publ. 1180.
- GILLETT, J.M. and C.J. KEDDY. 1983. *Gentianopsis detonsa* (Rottb.) Ma ssp. *raupii* (Porsild) Löve & Löve. In: Argus, G.W., et al., eds. Atlas of the rare vascular plants of Ontario. Botany Division, National Museum of Natural Sciences, Ottawa. 1 unnumbered p.
- GLEASON, H.A. and A. CRONQUIST. 1991. Manual of vascular plants of northeastern United States and adjacent Canada, ed. 2. The New York Botanical Garden, Bronx.
- ILTIS, H.H. 1965. The genus *Gentianopsis* (Gentianaceae): Transfers and phytogeographic comments. *Sida* 2:129–154.
- LAMMERS, T. 2003 [2004]. A new combination in *Gentianopsis virgata* (Rafinesque) Holub (Gentianaceae). *Michigan Bot.* 42:163.
- MASON, C.T., JR. and H.H. ILTIS. 1966 [1965]. Preliminary reports on the flora of Wisconsin. No. 53. Gentianaceae and Menyanthaceae—gentian and buckbean families. *Trans. Wisconsin Acad. Sci.* 54:295–329.

- PORSILD, A.E. and W.J. CODY. 1980. Vascular plants of continental Northwest Territories, Canada. National Museums of Canada, Ottawa.
- PRINGLE, J.S. 2002 [2003]. Nomenclature of the narrow-leaved fringed gentian of the Great Lakes region, *Gentianopsis virgata* (Raf.) Holub (Gentianaceae). Michigan Bot. 41: 137–140.
- RILEY, J.L. and S.M. MCKAY. 1980. The vegetation and phytogeography of coastal southwestern James Bay. Life Sci. Contrib. Roy. Ontario Mus. 124.
- SCOGGAN, H.J. 1979. The flora of Canada. Part 4—Dicotyledoneae (Loasaceae to Compositae). Natl. Mus. Nat. Sci. Publ. Bot. 7:1117–1711.
- TOYOKUNI, H. 1967–1968. Notes on *Gentianopsis* with special reference to Japanese species. Symb. Asahikawenses 2:57–72; 3:137–146.
- VOSS, E.G. 1996. Michigan flora: A guide to the identification and occurrence of the native and naturalized seed-plants of the state. Part III: Dicots (Pyrolaceae–Compositae). Cranbrook Inst. Sci. Bull. 61.
- WETTER, M.A., T.S. COCHRANE, M.R. BLACK, H.H. LITIS, and P.E. BERRY. 2001. Checklist of the vascular plants of Wisconsin. Wisconsin Dept. Nat. Resources Techn. Bull. 192.